13:19:49 OCA PAD INITIATION - PROJECT HEADER INFORMATION 09/20/89

Active

Project #: B-10-628 03 Cost share #: Rev #: 0
Center # : R6823-0A0 Center shr #: OCA file #:
Work type : RES
Contract#: SUBCONTRACT DTD 9/12/89 Mod #: Document : SUBCONT
Prime #: KA1-8901-1 Contract entity: GTRC

Subprojects ? : N
Main project #:

Project unit: OIP Unit code: 03.010.106
Project director(s):
KENNEDY P R OIP (404)894-4257

Sponsor/division names: EMORY UNIVERSITY / ATLANTA, GA
Sponsor/division codes: 400 / 012

Award period: 890715 to 900714 (performance) 900914 (reports)

Sponsor amount	New this change	Total to date
Contract value	27,272.00	27,272.00
Funded	27,272.00	27,272.00
Cost sharing amount		0.00

Does subcontracting plan apply ?: N

Title: ACCESSING CONTROL SIGNALS IN MOTOR CORTEX FOR RESTORATION OF MOVEMENTS...

PROJECT ADMINISTRATION DATA

OCA contact: Ina R. Lashley 894-4820

Sponsor technical contact

DR PHILIP R KENNEDY, M.D.
(404)894-4257
YERKES PRIMATE CENTER
EMORY UNIVERSITY
ATLANTA GA 30322

Sponsor issuing office

DR ANN R STEVENS, ASSOC VPR
(404)727-2503
OFFICE OF SPONSORED PROGRAMS
1462 CLIFTON RD., N.E. ROOM 303B
EMORY UNIV., ATLANTA, GA 30322

Security class (U,C,S,TS) : U
Defense priority rating : N/A
Equipment title vests with: Sponsor GIT
NONE PROPOSED

ONR resident rep. is ACO (Y/N): N
N/A supplemental sheet

Administrative comments -
INITIATION OF SUBCONTRACT.

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT

Closeout Notice Date 04/09/92

Project No. B-03-628 Center No. R6823-0A0

Project Director KENNEDY P R School/Lab BEC

Sponsor EMORY UNIVERSITY/ATLANTA, GA

Contract/Grant No. SUBCONTRACT DTD 9/12/89 Contract Entity GTRC

Prime Contract No. KA1-8901-1

Title ACCESSING CONTROL SIGNALS IN MOTOR CORTEX FOR RESTORATION OF MOVEMENTS...

Effective Completion Date 900714 (Performance) 900914 (Reports)

Closeout Actions Required:	Y/N	Date Submitted
Final Invoice or Copy of Final Invoice	Y	911002
Final Report of Inventions and/or Subcontracts	N	
Government Property Inventory & Related Certificate	N	
Classified Material Certificate	N	
Release and Assignment	N	
Other	N	

Comments

Subproject Under Main Project No.

Continues Project No.

Distribution Required:

Project Director	Y
Administrative Network Representative	Y
GTRI Accounting/Grants and Contracts	Y
Procurement/Supply Services	Y
Research Property Managment	Y
Research Security Services	N
Reports Coordinator (OCA)	Y
GTRC	Y
Project File	Y
Other	N
	N

Report to Dr. Tigges,
Yerkes Primate Research Center,
Emory University.

B03-628
2/28/91
Philip R. Kenn

PART II SECTION A:

1. **TITLE: LONG-TERM RECORDING OF NEURAL SIGNALS FROM MONKEY.**

KEYWORDS: **Unit recordings, monkeys, cone electrode, neural prosthetics, conditioning.**

2. Axis I: 1.
Axis II: 21.

3. PRC Unit: Division of Neurobiology.

4. (a) Kennedy, Philip R.
(b) MD, PhD.
(c) Division of Neurobiology.
(d) (O): Collaborative.

Co-Investigators:

(a) Tigges, Johannes
(b) PhD.
(c) Chief, Division of Neurobiology
(d) (C).

(a) Bakay, Roy A.E.
(b) MD
(c) Division of Neurobiology
(d) (C)

(a) Mirra, Sue
(b) MD
(c) Division of Neuropathology, VA
(d) (O)

5. Species: Macaque Mulatta.

6. Number: Four (4).

7. Non-Host Institution: Georgia Institute of Technology
Atlanta, Georgia 30332.

Veterans Administration Med. Center
Clairmont Road
Atlanta, Georgia

8. **Abstract**

Objectives: Determine **[1]** how long would the Cone electrode continue to monitor neural signals in monkeys, **[2]** what can be reveal at the electronmicroscopic level regarding the tissue inside the cone, **[3]** if neurotrophic substances can be used in the monkey to produce neural signals from the electrode, **[4]** if single units

can be controlled by the monkey.

The significance of this research in primates is that it will allow monitoring of neural signals over long time periods for the study of motor control, sensory responses, sensori-motor integration, plasticity experiments in the motor and sensory systems with its attendant questions of learning and memory, and, not least, its possible role as a neural prosthetic controller.

Methodology: Similar to the rat (see paper).

Results: **[1]** Recordings have continued until 15 months in one monkey who damaged the implant at that time. Waveshapes have been separated and their waveshape parameters applied to all recording sessions over the 15 months. This has revealed similar waveshapes for two units consistently, and for three other units during most sessions. **[2]** EM studies in monkey and rat show some myelinated neuronal processes inside the cone, as well as astrocytic cells, collagen and other material. To study this more closely, rats are being used that have cone electrodes filled with neurotrophic substances that result in recording of neural signals. At the EM level, myelinated fibers have been seen throughout the cone tissue. These studies are continuing in rats whose cone electrodes are being harvested at intervals after implantation. **[3]** Five electrode implants were made with neurotrophic substances (Matrigel or Laminin) inside the cone. Disappointingly, no signals were recorded from these implants. This may well be due to the possibility that the neurotrophic substances were inadequate and no neurites grew into the cone. The implant preparation is still intact and histological examination will be made in due course. **[4]** Experiments are getting underway to study the possibility that monkeys can control the firing of their own separated single units. These behavioral experiments require major equipment that has been installed and modified over the past few months.

SECTION B2:

Non-Host Institution:

Kennedy, P.R.
(a) FED, NIH
(b) (Nothing specified in the instructions).
(c) 5 RO1 NS24602-02
(d) $102,816.

Kennedy, P.R.
(a) PVAS
(b) (Nothing specified)
(c) APA Contract #KA1-8901-1
(d) $30,000

Kennedy, P.R.
(a) FDN (Emory-Georgia Tech)
(b) Nothing specified)

(c) 66-89TC
(d) $30,000

SECTION C:

LIST OF PUBLICATIONS

The following paper has been submitted to IEEE Trans. Biomed. Eng. for publication:

Long term recording of separated single units using the cone electrode in rats and monkeys. P.R. Kennedy, S.M. Sharpe, D.M. Banks, and R.A.E. Bakay.

The following paper forms the basis for the monkey implants:

The cone electrode: a long-term electrode that records from neurites grown onto its recording surface. P.R.Kennedy. J. Neuroscience Methods, 29 (1989) 181-193.

Abstracts:

Long-term recording of cortical units using the cone electrode in monkeys. Bakay R.A.E., Kennedy P.R. and Banks D.M. American Association of Neurological Surgeons, Abstract submitted for April 1991 meeting.

Long-term recording of cortical units using the cone electrode in monkeys. P.R.Kennedy, R.A.E.Bakay, N.Oyesiku and D.M.Banks. Soc. Neuroscience Abstracts, 16(2):1134, 1990.

Long-term recording of the same cortical units in monkeys using the cone electrode. Kennedy, P.R., Banks, D.M. and Bakay R.A.E. 21st Annual Neural Prosthesis Workshop, National Institutes of Health, October 1990.

The cone electrode: New concepts in long-term recording. Results in rat and monkey. P.R.Kennedy. Presented at the 20th Annual Neural Prosthesis Workshop, National Institutes of Health, Bethesda, MD, October 18-20, 1989.